JAN 16 1988

FLOOD INSURANCE STUDY

VILLAGE OF MAYFIELD, OHIO

CUYAHOGA COUNTY

REVISED

MARCH 16, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER 390116

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

This publication incorporates revisions to the original Flood Insurance Study. These revisions are presented in Section 9.0.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Coordination	1
1.3	Authority and Acknowledgments	1
2.0	AREA STUDIED	2
2.1	Scope of Study	2
2.2	Community Description	5
2.3	Principal Flood Problems	6
2.4	Flood Protection Measures	7
3.0	ENGINEERING METHODS	7
3.1	Hydrologic Analyses	7
3.2	Hydraulic Analyses	8
4.0	LAND USE APPLICATIONS	13
4.1	Flood Boundaries	13
4.2	Proposed Floodways	14
5.0	INSURANCE APPLICATION	15
5.1	Reach Determinations	18
5.2	Flood Hazard Factors	19
5.3	Flood Insurance Zones	19
5.4	Flood Insurance Rate Map Description	20
6.0	OTHER STUDIES	20
7.0	LOCATION OF DATA	20
8.0	BIBLIOGRAPHY AND REFERENCES	20

TABLE OF CONTENTS - continued

		Page
9.0	REVISIONS DESCRIPTION	24
9.1	First Revision (Revised March 16, 1988)	24
a.	Scope	24

FIGURES

Figure	1	-	Vicinity Map	3
Figure	2	-	Frequency-Discharge, Drainage Area Curves	9-10
Figure	3	-	Floodway Schematic	18

TABLES

Table	1	-	Summary of Discharges	11-12
Table	2	-	Floodway Data	16-17
Table	3	-	Flood Insurance Zone Data	21-22

EXHIBITS

Exhibit	1	-	Flood Profiles	
			Tributary 1	Panels 01P-03P
			Tributary 4	Panels 04P-06P
			Tributary 5D	Panels 07P-08P
Exhibit	2	-	Flood Boundary and Floodway Map Index	
			Flood Boundary and Floodway Map	Map 01-09
Exhibit	3	-	Elevation Reference Marks	Panel 01

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map Map 01-09

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Village of Mayfield, Ohio, and to aid in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the Village of Mayfield to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

A search for basic data was made at all levels of government. Cuyahoga County furnished two-foot contour interval topographic maps, which served as part of the input for the hydraulic analysis and the location of flood boundary lines. These maps were also used to prepare the maps in this report.

The Village of Mayfield, residents, and businesses therein furnished historic flood information and data needed to update the Cuyahoga County topographic maps.

The U. S. Army Corps of Engineers and the U. S. Geological Survey furnished flood data on the Chagrin River.

On September 6, 1974, an intermediate meeting was held with the Village Engineer to review the flood limits and discuss the concept of a floodway. On May 29, 1975, a final meeting was held to present the results of the study to the public.

1.3 Authorization and Financing

This Flood Insurance Study was conducted by Burgess & Niple, Limited at the request of the Federal Insurance Administration, U. S. Department of Housing and Urban Development. The source of authority for the study is the National Flood Insurance Act of 1968, as amended. Authority and financing are contained in Contract No. H-3691 between the contractor and the Federal Insurance Administration.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Mayfield, located in northeast Ohio. The area of study is shown on the Vicinity Map, Figure 1.

Included are all developed areas or areas likely to be developed within five years in which the 100-year flood boundary width is generally 200 feet or more, or 400 feet or more in areas of low property damage potential. Stream systems which cause flooding, meeting or exceeding these limitations, were studied by detailed methods to determine flood frequencies, profile elevations, and to define flood boundary limits. None of the streams flowing through the Cleveland Metropolitan Park were studied except to develop profiles upstream in developed areas.

Detailed studies have been performed on lengths of streams both downstream and upstream from the study limits reported, as appropriate, in order to provide for continuity of the flood profiles or otherwise to establish acceptable flood profile elevations. Approximate methods were used to extend the 100-year flood boundaries within the village beyond detailed study terminal points, and on other streams or channels where flood widths were estimated to be less than the minimum requirement for detailed studies.

Only one of the streams through the village has been named. For identification purposes, these streams have been assigned numbers and are shown on Exhibit 3.

Tributary 1 enters the Village of Mayfield from the west through a culvert under Interstate 271, north of Highland Road, and flows northeasterly crossing under S.O.M. Center Road and into the Cleveland Metropolitan Park District. It was studied in detail from the park road bridge upstream to the freeway. The reported limits, however, are confined to the length of stream west of S.O.M. Center Road inside the corporate boundary. Tributary 1A originates in the village just north of Beta Drive and flows northeasterly to its confluence with Tributary 1 in the Cleveland Metropolitan Park. It was studied by approximate methods from the park border, upstream to its origin.

Tributaries 2 and 3 originate and flow entirely within the Cleveland Metropolitan Park and, for this reason, were not studied or shown on the map.

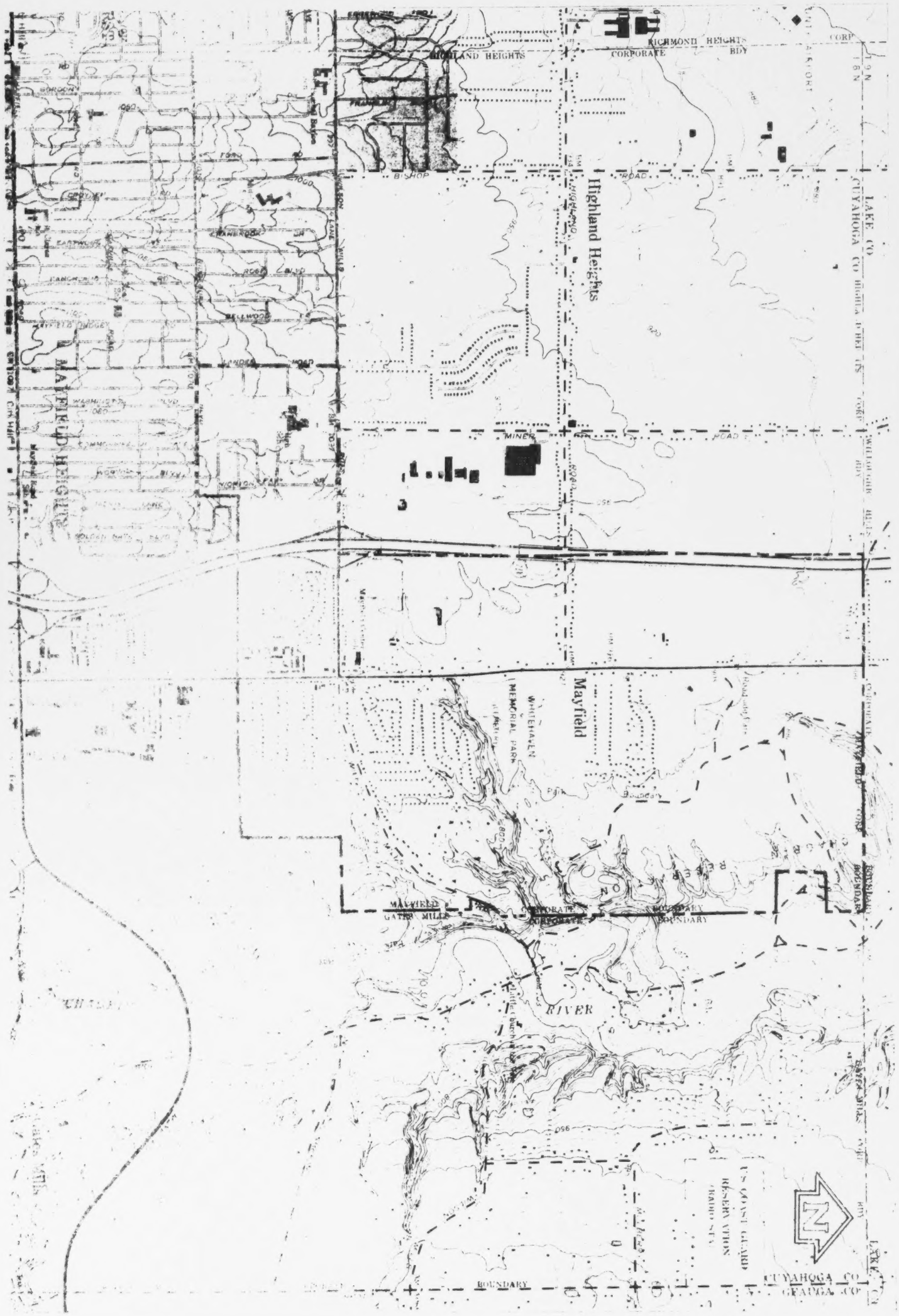


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

APPROXIMATE SCALE
0 2000 4000 6000 8000 FEET

VICINITY MAP

Tributary 4 enters the village under Interstate 271 north of Wilson Mills Road. It flows to the north and east through the industrial park in the vicinity of Beta Drive where portions of the ditch have been relocated and enclosed. From S.O.M. Center Road, it flows southeasterly into the metropolitan park where it turns and flows northeasterly through the park to the Chagrin River. It was studied in detail from the west park border to the freeway.

Beechers Brook originates in the south end of Mayfield between Interstate 271 and Beechers Brook Drive. It flows north along the freeway into the Mount Vernon Industrial Park where it turns east, flows through the industrial park under S.O.M. Center Road and to the Chagrin River. It was studied by approximate methods over its entire length.

There are five tributaries to Beechers Brook, which for identification purposes have been labeled 5A through 5E.

Tributary 5A originates in the vicinity of Oakwood Drive. It flows northeasterly generally paralleling and north of Wilson Mills Road, to its confluence with Beechers Brook and was studied by approximate methods. Tributary 5Aa is just north of and parallels Tributary 5A until their confluence and was also studied by approximate methods.

Tributary 5B begins at about Thornapple Drive, flowing to the northeast, north of and parallel to Ravine Drive to its confluence with Beechers Brook. It was studied by approximate methods. Tributary 5C flows north from Sandalwood Drive east of S.O.M. Center Road to its confluence with Beechers Brook and was also studied by approximate methods.

Tributary 5D originates as a storm sewer outfall under Ridgebury Road in the southwest corner of the village. It flows in a northeasterly direction crossing under the Interstate 271-Wilson Mills Road interchange to its confluence with Beechers Brook. A detailed study was conducted from Worton Park Drive upstream to Ridgebury Road. The remainder of Tributary 5D was studied by approximate methods as well as Tributary 5Da.

Tributary 5E enters the southwest corner of the Village of Mayfield and then leaves and reenters the village prior to flowing through

a culvert under Interstate 271 to its confluence with Beechers Brook. It was studied by detailed methods from the freeway to the south village limits.

Tributary 6 flows in and out of the southeast corner of the village. Where it enters and exists the village was studied by approximate methods.

Tributaries 6A and 6B were examined by approximate methods from their origin near Glenview Road to their confluence. Two other small tributaries, 6Ba and 6Bb, were also studied by approximate methods.

Tributary 7 originates west of Interstate 271. Through the village it flows generally north and parallels the freeway until it leaves the village in the northwest corner. It was studied by approximate methods from the north village limit to the point where it passes under Interstate 271 and out the western village limit.

2.2 Community Description

The Village of Mayfield is located in the northeast corner of Cuyahoga County. The first settlement in Mayfield Township in 1805 was located on the west side of the Chagrin River above the site of Wilson's Mills. Mayfield was originally under the civil jurisdiction of Willoughby Township in Lake County. When they formed their own township government, however, they entered into the townships of Cuyahoga County. In 1920, the township was divided into four villages. On July 6, 1920, the people in the north center of the township petitioned for a village to be called Mayfield Village (Reference No. 1). At that time, the population was 300. The village has grown steadily and as of the 1970 census had a population of 3,548. Adjacent communities include Highland Heights, Mayfield Heights, Gates Mills, and Willoughby Hills.

The climate of this area is classified as continental. Such a climate is a characteristic of a land mass the size of North America and is marked by large annual, daily, and day-to-day ranges in temperatures. Weather changes occur every few days from the passing of cold or warm fronts and their associated centers of high and low pressures. Average daily temperatures range from a minimum of about 40° F. to a maximum of 59° F. with an average annual temperature of about 50° F. (Reference No. 2).

As is characteristic of continental climates, precipitation varies widely from year to year; however, it is normally abundant and well distributed throughout the year with Spring being the wettest season. Average annual precipitation in the Village of Mayfield is about 40 inches, and the average annual water loss is about 23 inches per year resulting in an average runoff of 17 inches per year. Its distribution throughout the years is one of the major factors in determining the frequency and magnitude of flooding. A description of the methodology used in determining peak stream flow rates in the study area is provided under Engineering Methods.

There are six unnamed streams that flow through the community and one which is locally called Beechers Brook. All but one are tributary to the Chagrin River. Most of these streams originate either west or south of the village and flow in a northeasterly direction through the village to their mouths. Development has occurred along portions of most of these tributaries and, in some cases, has resulted in changing the stream location and/or enclosure of the channel. This is most evident in the Mount Vernon Industrial Park where Beechers Brook and Tributary 4 have been relocated to make more efficient use of the land.

The entire northeast portion of Mayfield is within the North Chagrin Reservation of the Cleveland Metropolitan Park District. This area is protected against private development and therefore was not studied.

Mayfield is expected to continue growing. Although there have been no recent changes to the corporate limits, nor are any proposed, additional development is currently taking place in the Beta Drive area and is proposed for the areas north of Highland Road and south of Metro Park Drive. The Cuyahoga County Regional Planning Commission estimates that by 1980 the population of the Village of Mayfield will reach 4,900 (Reference No. 3).

2.3 Principal Flood Problems

Since there are no gaging stations on any of the local streams, the only records of past floods are the recollections of residents and past newspaper accounts.

An article in the Sun Messenger (Reference No. 4) on June 29, 1972 indicated that a flood the previous week caused basements

to flood, streams to overflow, and sanitary sewers to back up. The hardest hit areas were Hickory Hill Drive and Wilson Mills-S.O.M. Center Road. Water came within inches of basement ceilings in the houses along Hickory Hill Drive as torrents of water rushed down to Hickory Hill, starting on higher land south of Metro Park Drive. In the Wilson Mills-S.O.M. Center Road area, a sanitary sewer backed up and flooded basements. In the Worton Park subdivision, a stream overflowed its banks and rose over bridges that span driveways.

The following summer another storm caused severe flooding in Mayfield. On June 7, 1973, the Sun Messenger (Reference No. 5) reported that the area hardest hit in Mayfield was the Worton Park area where the flood waters rushed into the houses, causing hundreds of dollars of damage. Streets were inundated and traffic was stopped. Mr. Robert G. Beebe indicated that basements were pumped out on Robley Lane which was the second hardest hit area and that water was rushing down like the Niagara River behind the houses on Hickory Hill Drive.

2.4 Flood Protection Measures

There are no existing flood protection works within the Village of Mayfield and none are proposed.

3.0 ENGINEERING METHODS

For streams studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10-, 50-, 100-, and 500-years have been selected as having special significance for the land use and flood insurance applications of the flood insurance program. The analyses reported here reflect current conditions in the watersheds of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the village.

Because there are no stream flow records for any of the tributaries in the village, methods and data presented in Bulletin 43 (Reference No. 6) were used to compute the mean annual flood. Discharges

for the 10-, 50-, 100-, and 500-year floods were extrapolated from a plot of the 20- and 50-year floods in ratio to the mean annual flood. This approach does not, however, adequately reflect the effect of impervious areas and storm sewer development on peak flows from the small predominantly urban watersheds. A procedure developed in U. S. Geological Survey Water Paper 2001-C (Reference No. 7) was used to adjust the frequency discharge rates to account for development within each watershed. The resulting discharges in relation to drainage areas are shown on Figure 2. The discharges are also listed in Table 1. It should be noted that adjustments were made, see footnotes to Table 1, to account for diversion of flow from one tributary into another. Diverted flows were not added to the natural flow in the tributary, however, since each flood occurrence was considered to be a separate event on each watershed. That is, flood flows for each stream were examined independently of each other. If, for example, a diversion occurred from Beechers Brook to Tributary 4, the flows in Beechers Brook were reduced below the diversion point by the amount diverted. Estimated flood flows for Tributary 4, however, do not include the amount diverted from Beechers Brook. Thus, the probability of flood occurring simultaneously on the two streams was not examined.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of streams in the community is carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in detail.

Water surface elevations of floods of the selected recurrence intervals were computed through use of the United States Army Corps of Engineers, HEC-2 computer program "Water Surface Profiles" (Reference No. 8). Cross section geometry for the channels was field surveyed. Cross section geometry for overbank areas was taken from existing two-foot contour maps (Reference No. 9). These maps were supplemented with grading plans of recent developments. Locations of selected cross sections used in the hydraulic analyses are shown on Exhibits 1 and 3.

Roughness factors (Manning's "n") for these computations were assigned on the basis of field inspection of flood plain and channel areas.

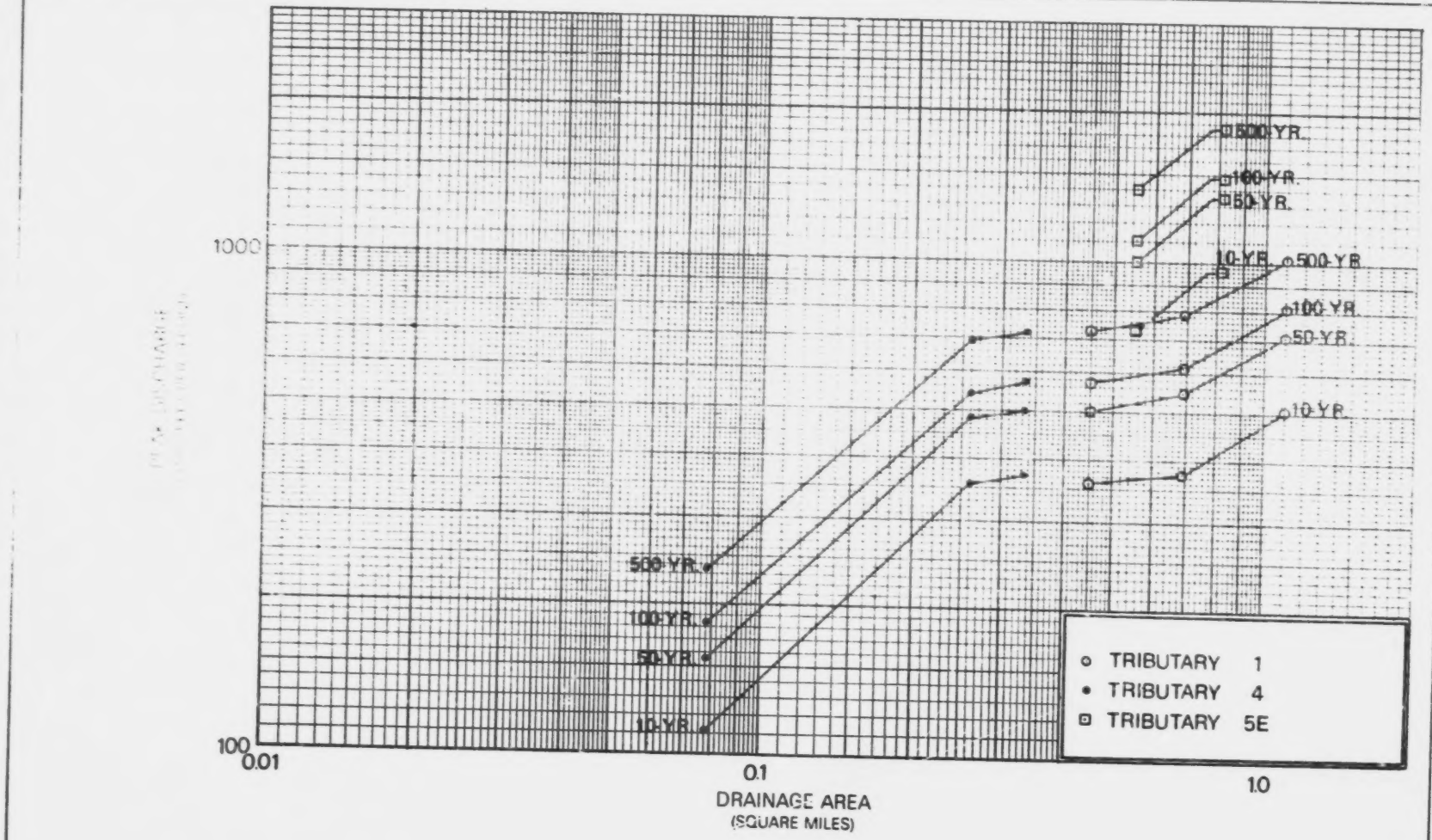


FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

(CUYAHOGA CO.)

FREQUENCY—DISCHARGE, DRAINAGE AREA CURVES

TRIBUTARY 1 , TRIBUTARY 4 , TRIBUTARY 5E

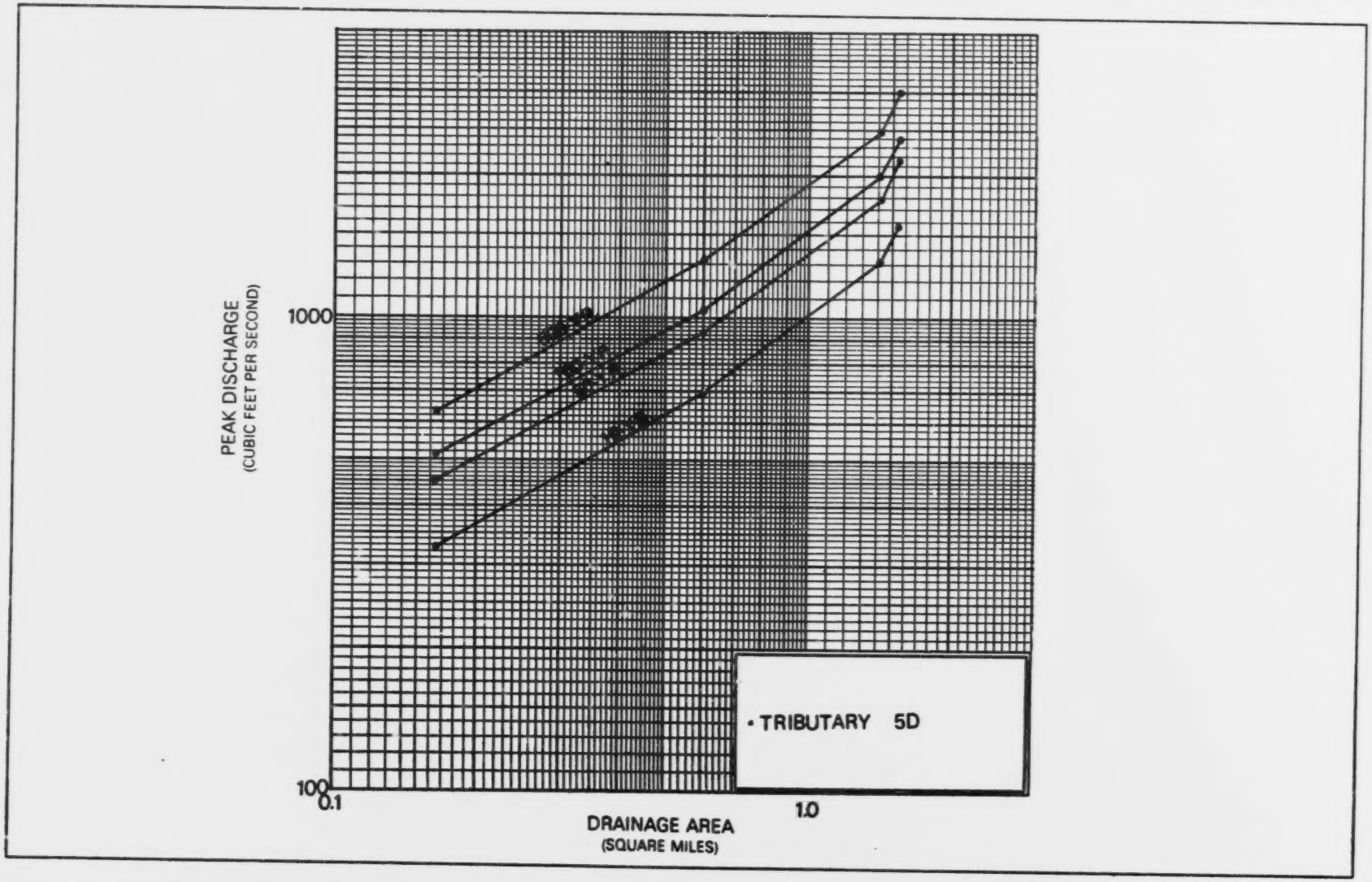


FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

FREQUENCY—DISCHARGE, DRAINAGE AREA CURVES

TRIBUTARY 5D

Stream and Location	Peak Discharge, cfs			
	10-Year	50-Year	100-Year	500-Year
Tributary 1				
S.O.M. Center Road to Interstate 271 (1)	284	442	516	681
Tributary 4 (2)				
Upstream of Cross Section A	360	470	512	640
Upstream of Cross Section D	350	460	495	615
Upstream of Cross Section G	290	380	410	505

(1) These flows have been reduced by 100 cfs to reflect diversion out of the watershed along the highway ditch downstream of Interstate 271.

(2) All 50-, 100-, and 500-year flows have been reduced by 20, 45, and 75 cfs, respectively, to reflect diversion out of the watershed along the highway ditch upstream of Interstate 271.

TABLE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

PEAK DISCHARGE

TRIBUTARY 1, TRIBUTARY 4

Stream and Location	Peak Discharge, cfs			
	10-Year	50-Year	100-Year	500-Year
Tributary 5D				
Upstream of Cross Section A	650	885	1,000	1,250
Upstream of Cross Section B	635	860	970	1,220
Upstream of Cross Section G	610	840	940	1,190
Upstream of Cross Section H	330	450	510	640
Tributary 5E				
Upstream of Cross Section A (3)	400	410	420	450
Upstream of Cross Section B	730	1,010	1,120	1,400

(3) The 10-, 50-, 100-, and 500-year flows have been reduced by 330, 600, 600, and 950 cfs, respectively, to reflect diversion along the upstream Interstate 271 freeway ditch.

TABLE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

PEAK DISCHARGE

TRIBUTARY 5D, TRIBUTARY 5E

Flood profiles were drawn showing computed water surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals, Exhibit 1. Starting elevations were developed by the slope-area method downstream of the reported reaches. All elevations are measured from mean sea level datum; elevation reference marks used in the study are shown on the separately printed Flood Insurance Rate Map.

Approximate methods of analysis were used on the remaining streams described under Scope of Study. At selected points on these streams, the drainage area was calculated and the discharge for the 100-year flood determined from the drainage area-discharge relationships previously derived in detail study reaches. Approximate depths of flooding by the slope-area method were then computed at these points in order to estimate the extent of flooding. No flood profiles were developed for streams and channels considered by approximate methods.

The calculated flood profile depth at some locations resulted in flow being diverted into adjacent tributaries, which required adjustment of downstream discharge rates, see footnotes to Table 1, and revision of the flood profile.

Flood elevations may be raised by ice jams during spring thaws; the hydraulic analyses for this study, however, are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are thus considered valid only if hydraulic structures in general remain unobstructed.

4.0 LAND USE APPLICATION

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a Flood Boundary and Floodway Map, Exhibit 3, designed to assist communities in developing flood plain management measures that will provide the best use of their flood plain lands.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community.

For each stream studied in detail, the boundaries of the 100-year and the 500-year flood have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800 with a contour interval of 2 feet (Reference No. 9). In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

At several locations, the approximate 100-year flood was estimated to reach an elevation which would cause flood flows to spill over into adjoining watersheds. This overflow does not always follow a defined channel and is termed sheet flow and designated as Zone AO.

On Tributary 4, part of the 100-year flood flow enters a culvert at Beta Drive and the rest overflows onto Beta Drive at an approximate depth of 1.5 feet. The same situation occurs where Beechers Brook crosses Beta Drive. The culvert at Beta Drive is overtopped and flow is diverted north along Beta Drive at an approximate depth of 1.5 feet. Just upstream of Beta Drive, the 100-year flood reaches an elevation which causes overflow behind Stanley Air Tool at an approximate depth of 1 foot. Beechers Brook also overflows onto Wilson Mills Road at approximately the same depth. Downstream of Wilson Mills Road, Beechers Brook reaches an elevation which causes overflow in front of the Holiday Inn at a depth of approximately 1.5 feet. Just upstream of Interstate 271, Tributary 5D flows over the entrance ramp and is diverted along Wilson Mills Road at an approximate depth of 1 foot. In the Worton Park area, Tributary 5Da overflows the enclosure under Woodlane Drive by about 2 feet.

Small areas within the flood boundaries may lie above the flood elevations and therefore not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

4.2 Proposed Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood carrying capacity and increases flood heights, thus increasing flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a proposed floodway and a floodway fringe. The floodway is the channel of a

stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights.

The Flood Plain Management Section, Division of Planning, Ohio Department of Natural Resources recommends as the regulatory flood plain the area confined within the 100-year flood boundary. Within this area, they define a floodway as being the channel and those parts of the adjoining flood plain that are reasonably required to carry and discharge the 100-year flood. Furthermore, they recommend that the floodway be designated so that permissible encroachments in the regulatory flood plain will not cause a cumulative (over several reaches) increase in stage of the 100-year flood of more than 0.5 foot in any one reach.

The floodway proposed for this study was initially computed on the basis of equal conveyance reduction from each side of the flood plain and then adjusted to smooth out the floodway boundaries. The results of these computations are presented in Table 2 at selected cross sections for each stream studied in detail. The difference shown in the table indicates the rise in the 100-year flood profile elevation that would theoretically be expected if the floodway fringe areas shown on Exhibit 3 were completely filled and not available to convey flood water. At some cross sections, the theoretical rise in the 100-year flood elevation is shown to be slightly more or less than the 0.5 foot target value. This is occasioned either to establish a more uniform and practical floodway limit or to otherwise prevent excessive rises in the upstream flood profile or increases in velocity in the stream channel or overbank areas within the floodway limits.

Floodway boundaries were determined at cross sections; between cross sections the boundaries were interpolated. The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown on Figure 3.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source affecting the Village of Mayfield.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	STATION[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	DIFFERENCE (FT.)
Tributary 1							
A	1.64	150	520	1.0	902.7	902.2	0.5
B	1.65	150	390	1.3	902.7	902.2	0.5
C	1.78	110	110	4.5	907.2	907.0	0.2
D	1.93	205	450	1.1	913.2	912.7	0.5
E	2.05	140	270	1.9	915.9	915.5	0.4
F	2.15	180	260	2.0	918.6	918.2	0.4
G	2.20	20	80	6.3	921.6	920.5	0.2
Tributary 4							
A	1.90	60	160	3.2	916.1	915.6	0.5
B	2.04	75	240	2.2	921.7	921.2	0.5
C	2.15	75	180	2.8	924.7	924.2	0.5
D	2.21	140	220	2.3	927.6	927.1	0.5
E	2.22	140	440	1.1	929.2	928.7	0.5
F	2.24	130	370	1.3	929.3	928.8	0.5
G	2.25	90	230	2.2	929.3	929.1	0.2
H	2.27	60	130	3.8	929.5	929.2	0.3
I	2.41	50	90	4.4	934.3	933.8	0.5

[1]MILES ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

FLOODWAY DATA

TRIBUTARY 1 AND 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	STATION[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	DIFFERENCE (FT.)
Tributary 5D							
A	0.55	90	370	2.7	1,033.3	1,033.3	0.0
B	0.56	65	240	4.1	1,033.8	1,033.4	0.4
C	0.61	105	360	2.7	1,034.8	1,034.4	0.4
D	0.64	80	270	3.6	1,035.1	1,034.7	0.4
E	0.65	80	290	3.3	1,035.8	1,035.4	0.4
F	0.67	100	260	3.7	1,036.0	1,035.5	0.5
G	0.68	110	300	3.1	1,036.3	1,035.8	0.5
H	0.72	100	150	3.5	1,037.3	1,037.0	0.3
I	0.75	90	200	2.6	1,038.3	1,038.0	0.3
J	0.76	70	130	4.0	1,039.2	1,038.8	0.4
K	0.79	70	170	3.0	1,040.4	1,039.9	0.5
L	0.83	70	130	4.0	1,041.8	1,041.3	0.5
M	0.85	60	200	2.6	1,043.5	1,043.0	0.5
N	0.87	50	100	4.9	1,043.8	1,043.3	0.5
O	0.91	25	80	6.0	1,046.1	1,046.0	0.1

[1] MILES ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

FLOODWAY DATA

TRIBUTARY 5D

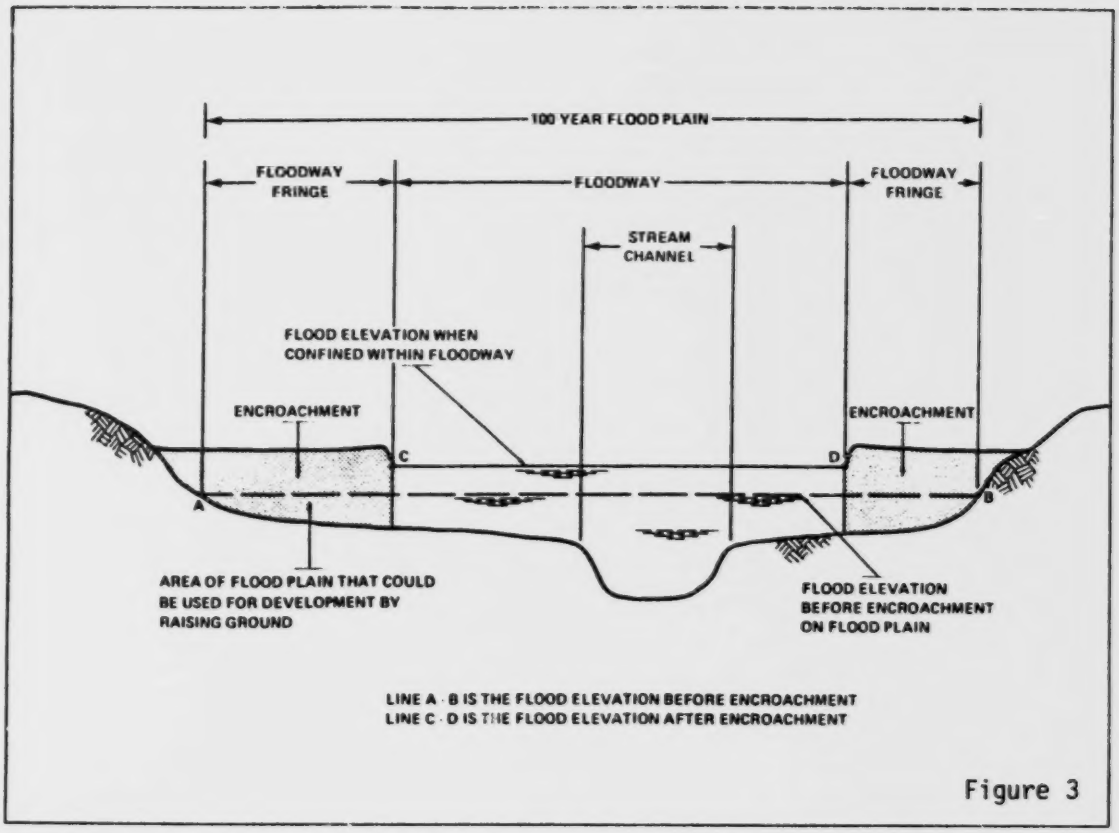


Figure 3

5.1 Reach Determination

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water surface elevations between the 10- and 100-year floods. This difference did not have a variation greater than 0.5 foot for more than 20 percent of the reach.

Four reaches meeting the above criteria were required for the flooding sources of Mayfield. These included one on Tributary 1 from river mile 1.63 to river mile 2.24; one on Tributary 4 from river mile 1.90 to river mile 2.41; one on Tributary 5D from river mile .55 to river mile .91; and one on Tributary 5E from river mile .14 to river mile .27. The locations of the reaches are shown on the flood profiles, Exhibit 1.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is the Federal Insurance Administration device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water surface elevations expressed to the nearest one-half foot, and shown as a three digit code. For example, if the difference between water surface elevations of the 10-year and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050.

5.3 Flood Insurance Zones

After the determination of reaches and their respective Flood Hazard Factors, the entire incorporated area of Mayfield was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special flood hazard areas inundated by the approximate 100-year flood. Base flood elevations are not determined.
Zone AO:	Special flood hazard areas that have shallow flood depths and/or unpredictable flow paths. Base flood elevations are not determined.
Zone A1:	Special flood hazard areas inundated by the 100-year flood with base flood elevations determined and zone designations assigned according to FHF.
Zone B:	Area between Zone A1 and the limits of the 500-year flood.
Zone C:	Area not subject to flooding by the 500-year flood.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for each flooding source in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of Mayfield is, for insurance purposes, the net result of the Flood Insurance Study.

Published separately, as part of this study, it is the official map on which the Federal Insurance Administration has delineated the flood insurance zones and base flood elevation lines. Base flood elevation lines show the expected whole-foot water-surface elevations of the base (100-year) flood and the locations at which these elevations would occur. These maps are developed in accordance with the latest flood insurance map preparation guidelines published by FIA.

6.0 OTHER STUDIES

A Flood Plain Information Report has been prepared by the U. S. Army Corps of Engineers (Reference No. 10) and a Map of Flood Prone Areas (Reference No. 11) has been published by the U. S. Geological Survey, both of which pertain to flooding along the Chagrin River. Both of these referenced materials show a small area in Mayfield which would be flooded by the Chagrin River. Since this area is within the Cleveland Metropolitan Park, it was not included in this study.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study are on file for five (5) years at the home office of Burgess & Niple, Limited, Consulting Engineers, 5085 Reed Road, Columbus, Ohio 43220.

8.0 BIBLIOGRAPHY AND REFERENCES

1. Coates, William R., A History of Cuyahoga County and the City of Cleveland, Chicago and New York: The American Historical Society, 1924.

2. Miller, Marvin E., Climatic Guide for Selected Locations in Ohio, prepared by the Environmental Science Services Administration, U. S. Department of Commerce, in cooperation with the Ohio Agricultural Research and Development Center and the Ohio Department of Natural Resources.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Tributary 1	01, 03	-0.36	-0.10	0.19	005	A1	Varies
Tributary 4	03, 05	-0.33	-0.07	0.19	005	A1	Varies
Tributary 5D	07	-0.39	-0.12	0.20	005	A1	Varies
Tributary 4	05	Sheet Flow Area				A0	Est. Depth 1.5'
Beechers Brook at Beta Drive	05	Sheet Flow Area				A0	Est. Depth 1.5'
Beechers Brook upstream of Beta Drive	05	Sheet Flow Area				A0	Est. Depth 1.0'
Beechers Brook at Wilson Mills Road	07	Sheet Flow Area				A0	Est. Depth 1.0'
Beechers Brook downstream of Wilson Mills Road	07	Sheet Flow Area				A0	Est. Depth 1.5'

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

REVISED: 3/16/88

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

FLOOD INSURANCE ZONE DATA

TRIBUTARIES 1, 4, 5D AND 4, BEECHERS BROOK

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND:[2]			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Tributary 5D	07	Sheet Flow Area				AO	Est. Depth 1.0'
Tributary 5Da	07	Sheet Flow Area				AO	Est. Depth 2.0'

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

FLOOD INSURANCE ZONE DATA

TRIBUTARY 5D AND 5Da.

3. Cuyahoga County Regional Planning Commission, "1975 & 1980 RPC County Population Projection," May 1972.

4. "Emergency in Mayfield Village," Sun Messenger, June 29, 1972.

5. "Flooding Hits Hillcrest Hard," Sun Messenger, June 7, 1973.

6. Cross, William P. and Mayo, Ronald I., Floods in Ohio, Magnitude and Frequency, A Supplement to Bulletin 32, prepared in cooperation with the Division of Water, Ohio Department of Natural Resources, Bulletin 43, April 1969.

7. Anderson, Daniel G., "Effects of Urban Development on Floods in Northern Virginia," U. S. Geological Survey Water Supply Paper 2001-C, 1970.

8. Computer Program 723-X6-L202A, HEC-2, "Water Surface Profiles," The Hydrologic Engineering Center, Corps of Engineers, U. S. Army.

9. Cuyahoga County Topographic Map, Aero Service Corporation, 1955.

10. "Flood Plain Information, Chagrin River in the Counties of Lake and Cuyahoga, Ohio," U. S. Army Engineers, Buffalo District, July 1968.

11. "Map of Flood Prone Areas, Mayfield Heights, Ohio," U. S. Geological Survey, 1973.

9.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at the Village of Mayfield, Building Department, 610 S.O.M. Center Road, Mayfield, Ohio.

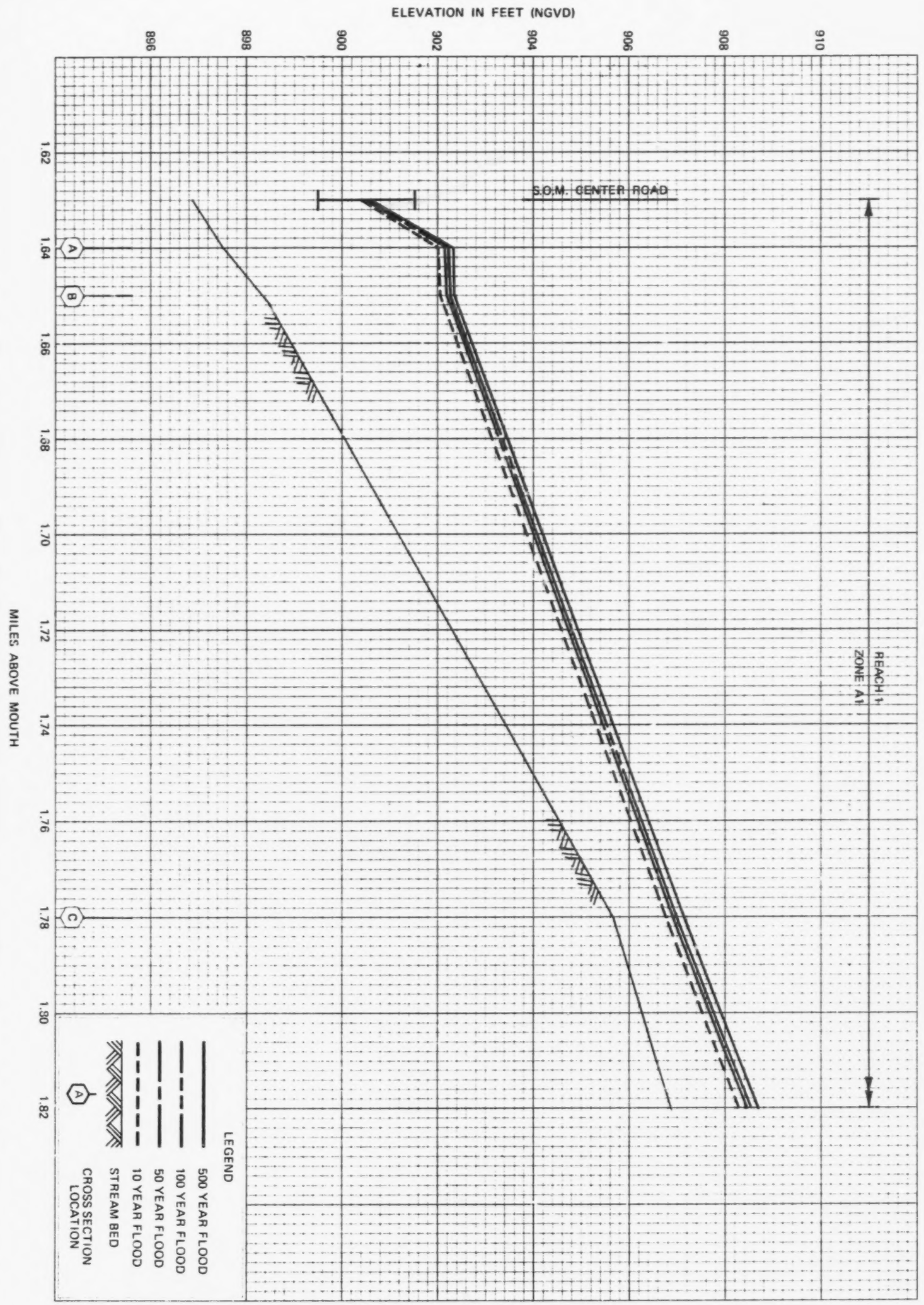
9.1 First Revision (Revised March 16, 1988)

a. Scope

On February 3, 1978, the Flood Insurance Rate Map was revised to change base flood elevations, zone designations, and to relocate the stream channel for Tributary 5E. In addition, areas along Wilson Mills Road between Interstates 271 and 290 and Beta Drive, along Beta Drive between Wilson Mills Road and S.O.M. Center Road, and the upstream reaches of Tributaries 4 and 5Da, were revised to Zone B, areas of moderate flood hazards.

At the time the Flood Insurance Rate Map was revised, the Flood Insurance Study text and Flood Boundary and Floodway Maps were not revised to reflect the changes to the Flood Insurance Rate Map. Presently, the Ohio Department of Natural Resources has requested that the Federal Emergency Management Agency (FEMA) resolve the discrepancy between the Flood Insurance Rate Map and Flood Boundary and Floodway Maps.

Based on the previous channel improvements and since the contributing drainage area is less than one square mile, the special flood hazard areas along Tributary 5E have been changed to Zone B, areas of moderate flood hazards. FEMA generally considers that drainage areas less than one square mile should be addressed as a local drainage problem and need not be included in a special flood hazard area. Since Tributary 5E is no longer in a special flood hazard area, the flood profiles, base flood elevations, and floodway have been deleted. The Flood Insurance Study text, Flood Insurance Rate Map, and Flood Boundary and Floodway Maps have been revised to reflect these changes.



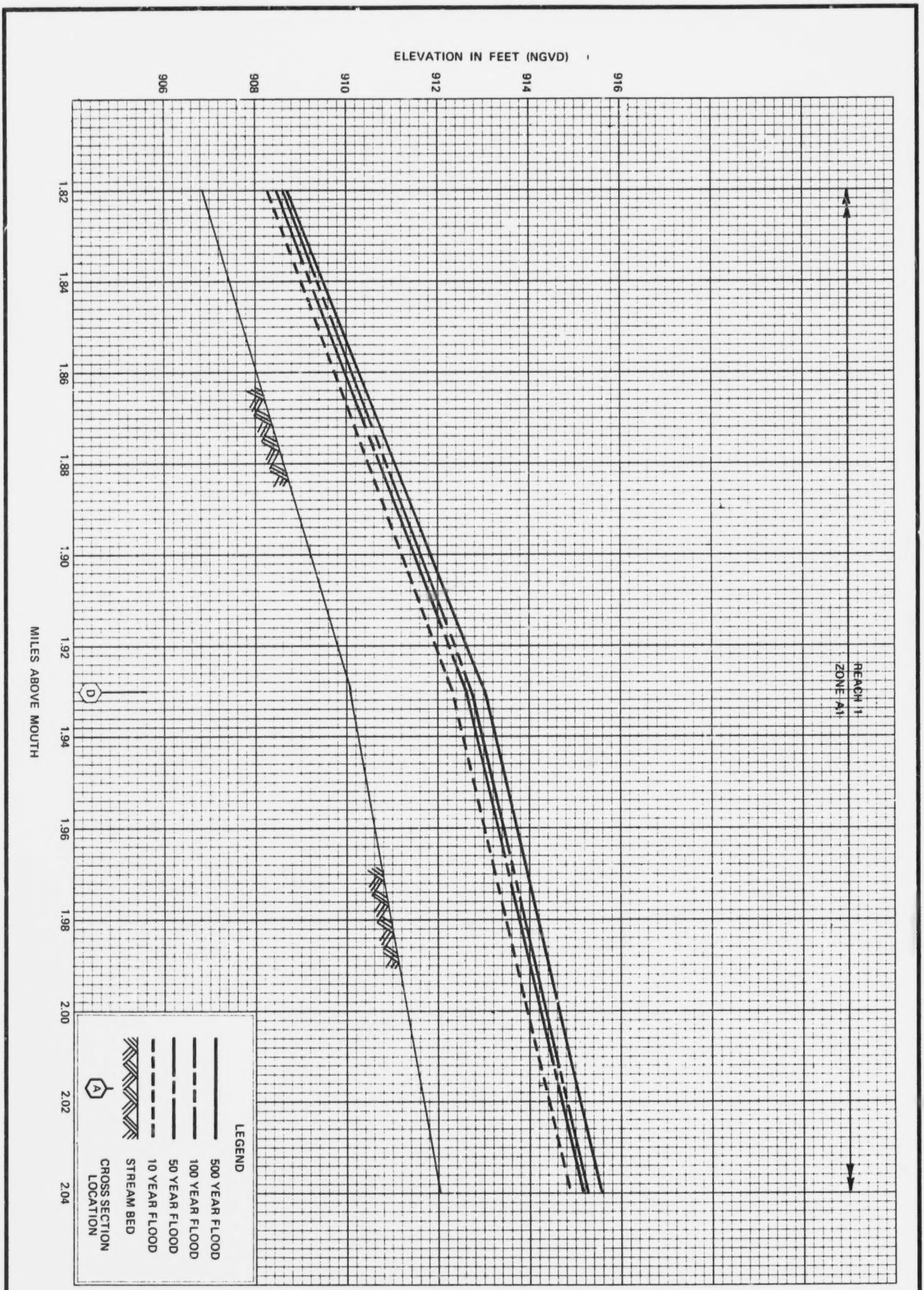
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

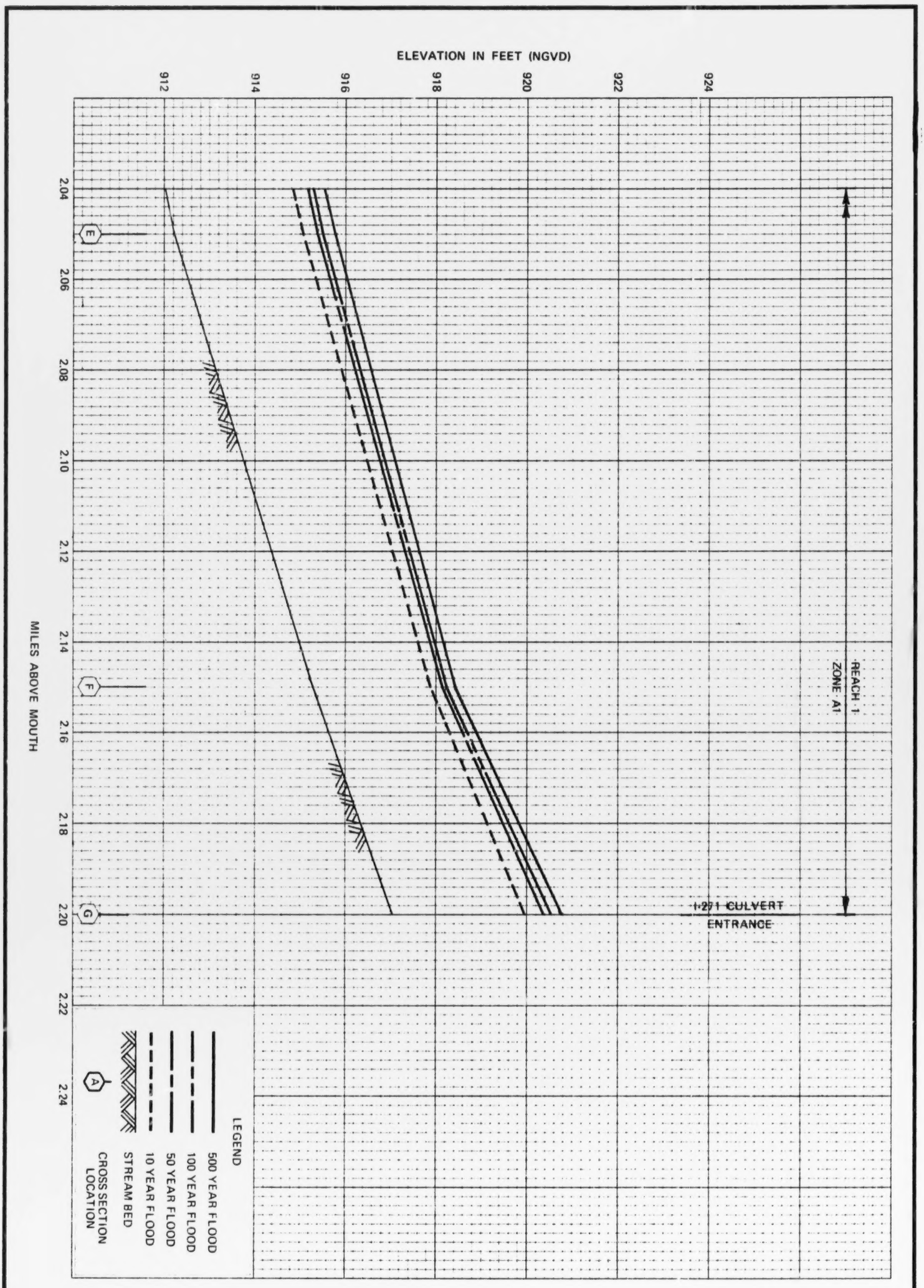
FLOOD PROFILES

TRIBUTARY 1

01P



02P	FEDERAL EMERGENCY MANAGEMENT AGENCY **VILLAGE OF MAYFIELD, OH** (CUYAHOGA CO.)	**FLOOD PROFILES** **TRIBUTARY 1**



03P

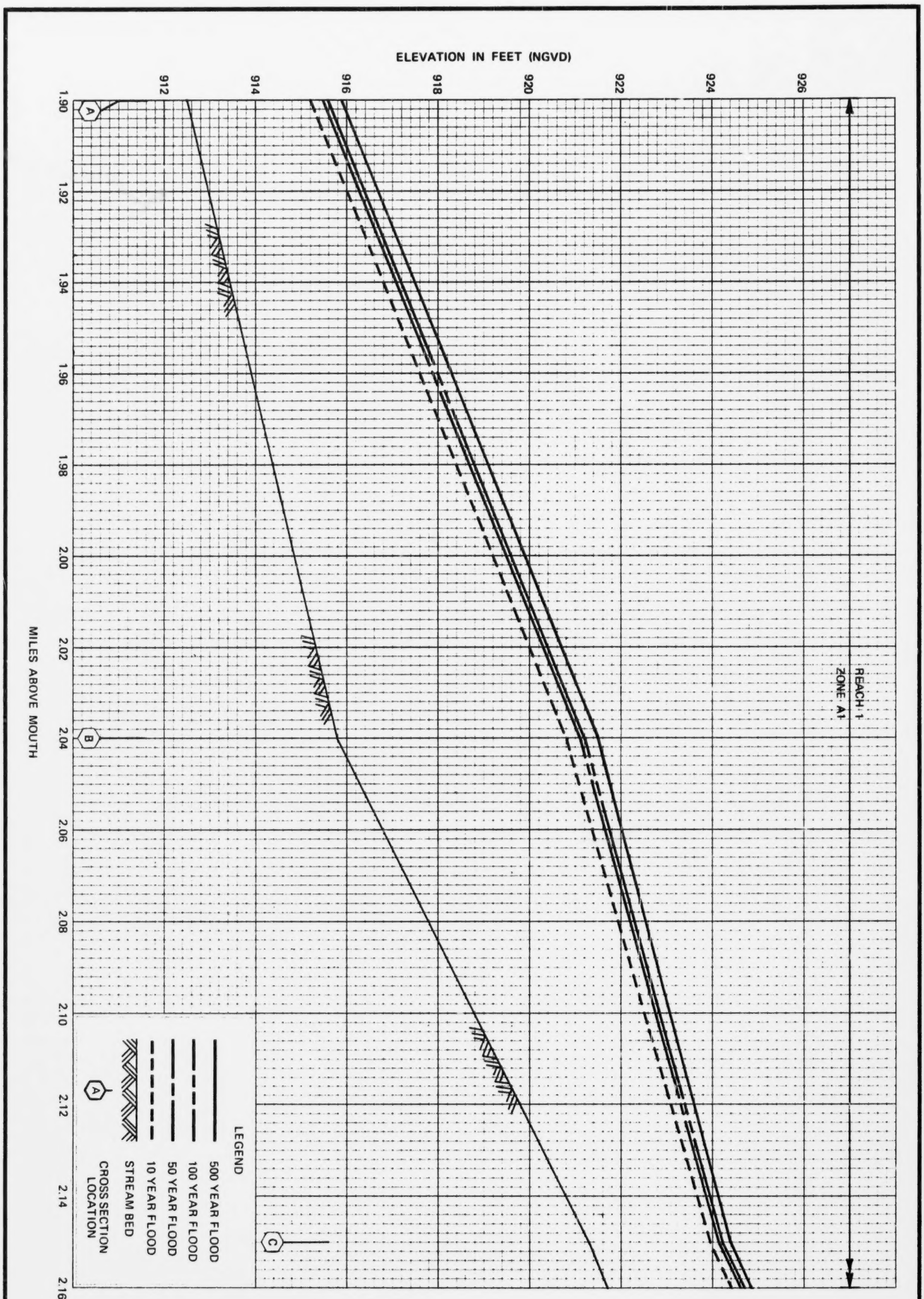
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

(CUYAHOGA CO.)

FLOOD PROFILES

TRIBUTARY 1



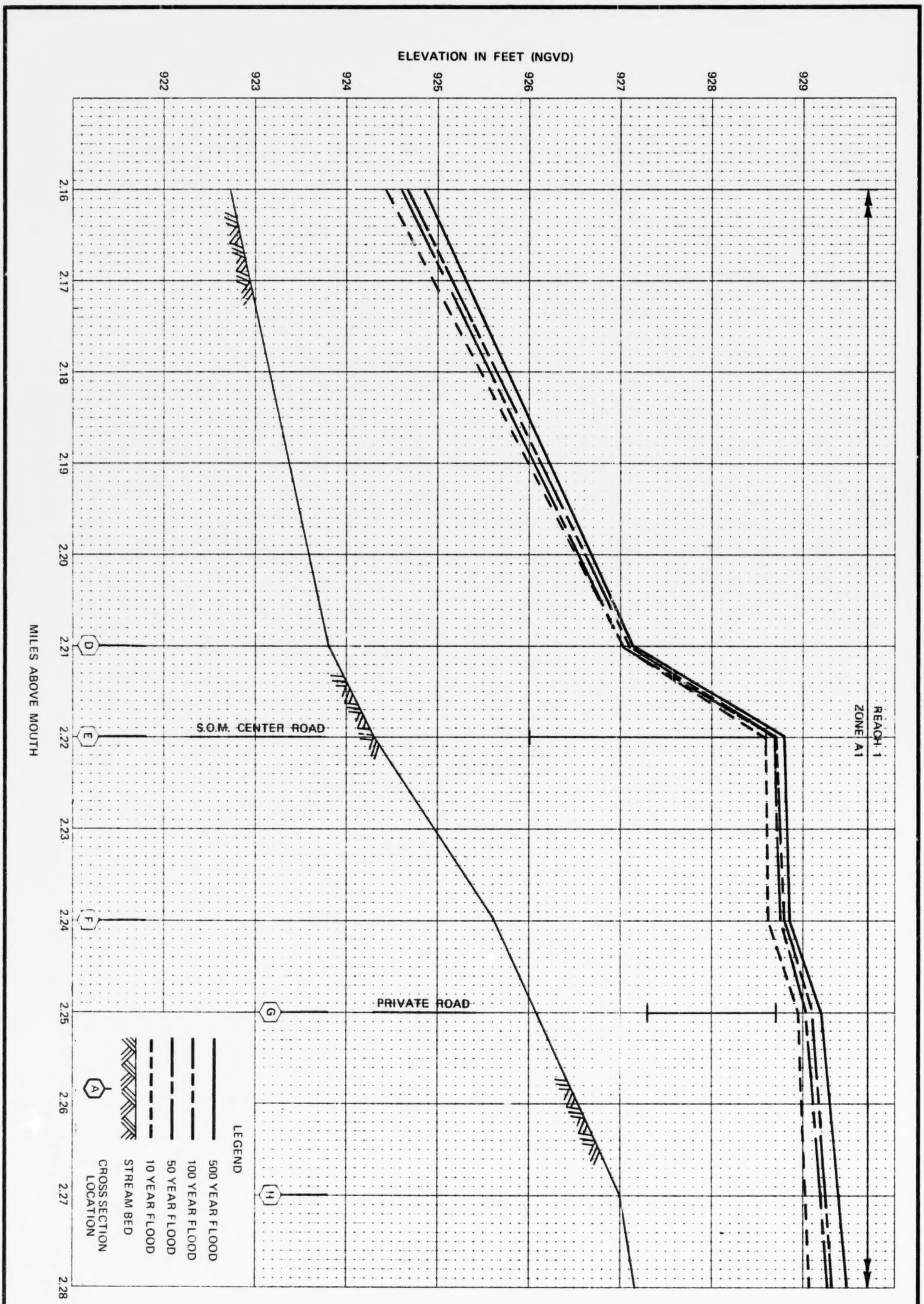
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

FLOOD PROFILES

TRIBUTARY 4

04P



05P

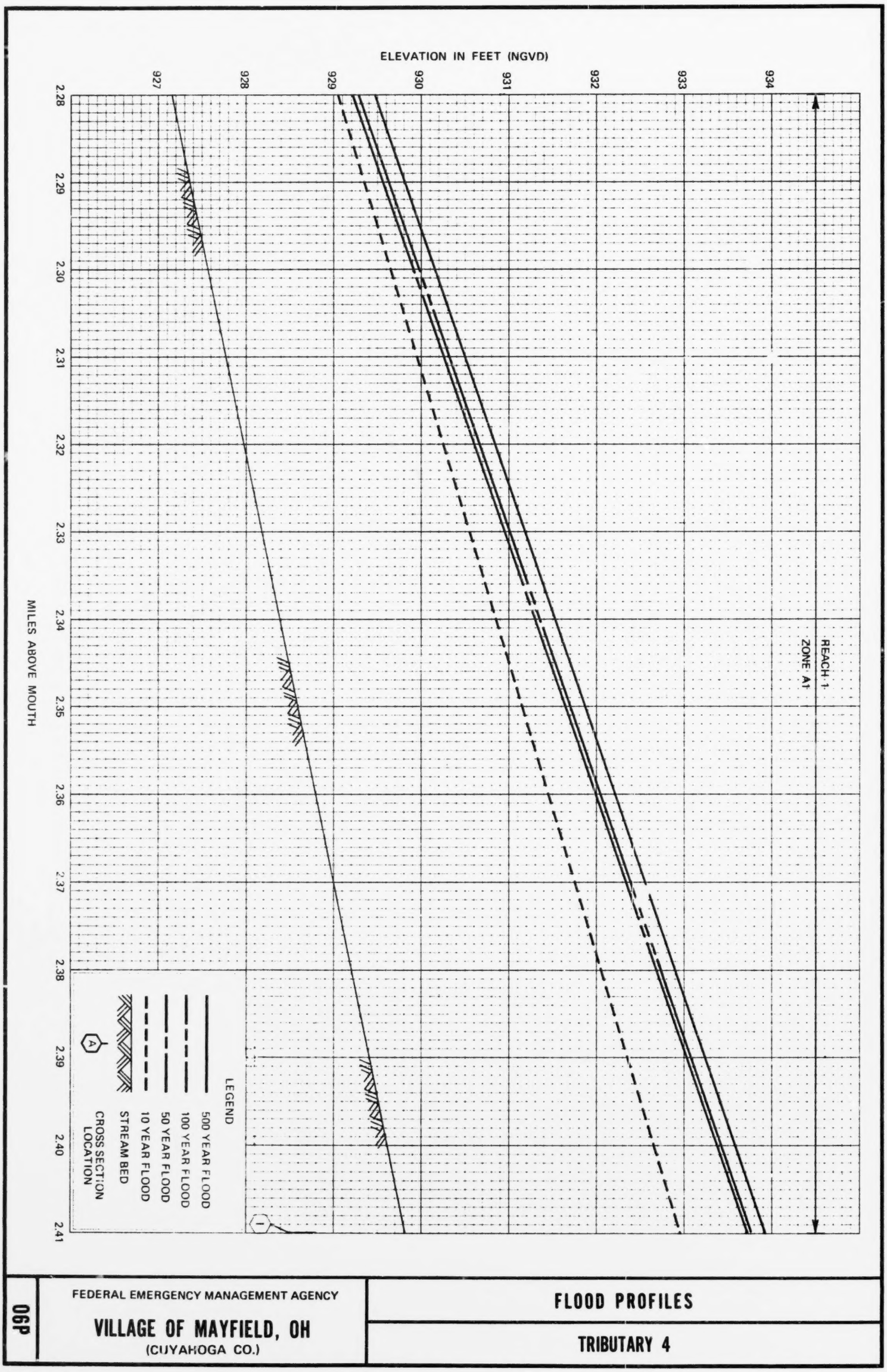
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

(CUYAHOGA CO.)

FLOOD PROFILES

TRIBUTARY 4



06P

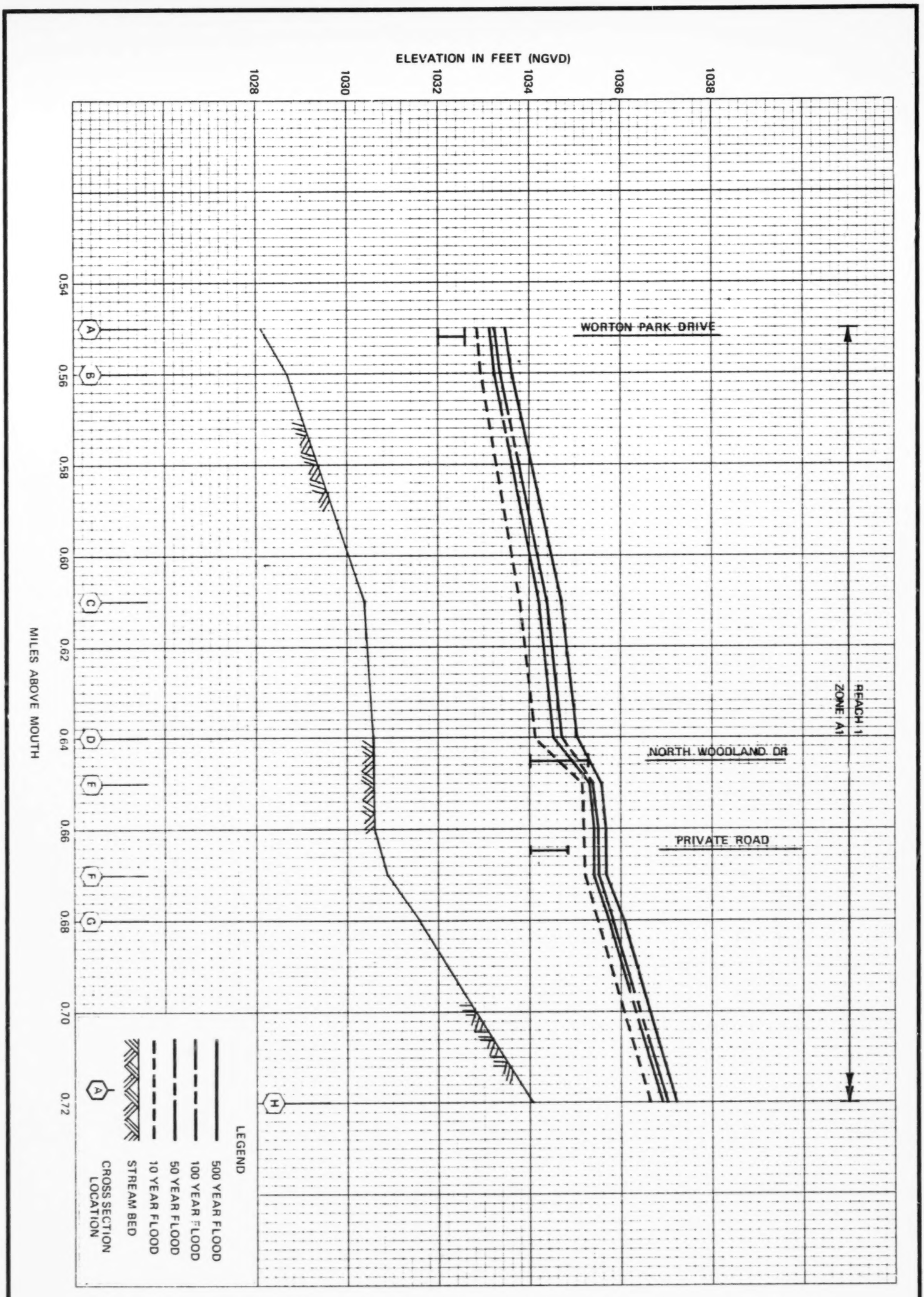
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

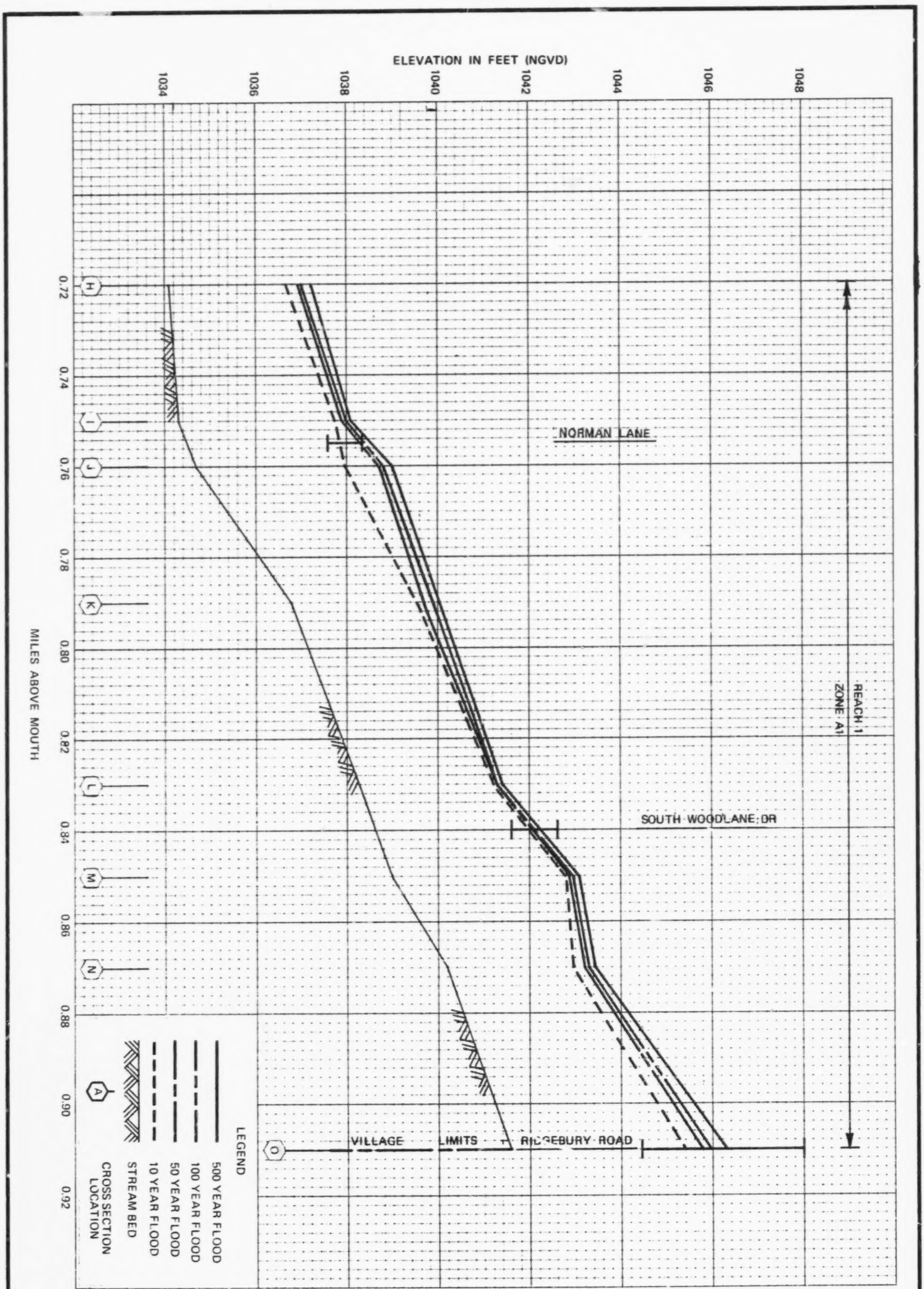
(CUYAHOGA CO.)

FLOOD PROFILES

TRIBUTARY 4



07P	FEDERAL EMERGENCY MANAGEMENT AGENCY **VILLAGE OF MAYFIELD, OH** (CUYAHOGA CO.)	**FLOOD PROFILES** **TRIBUTARY 5D**



08P

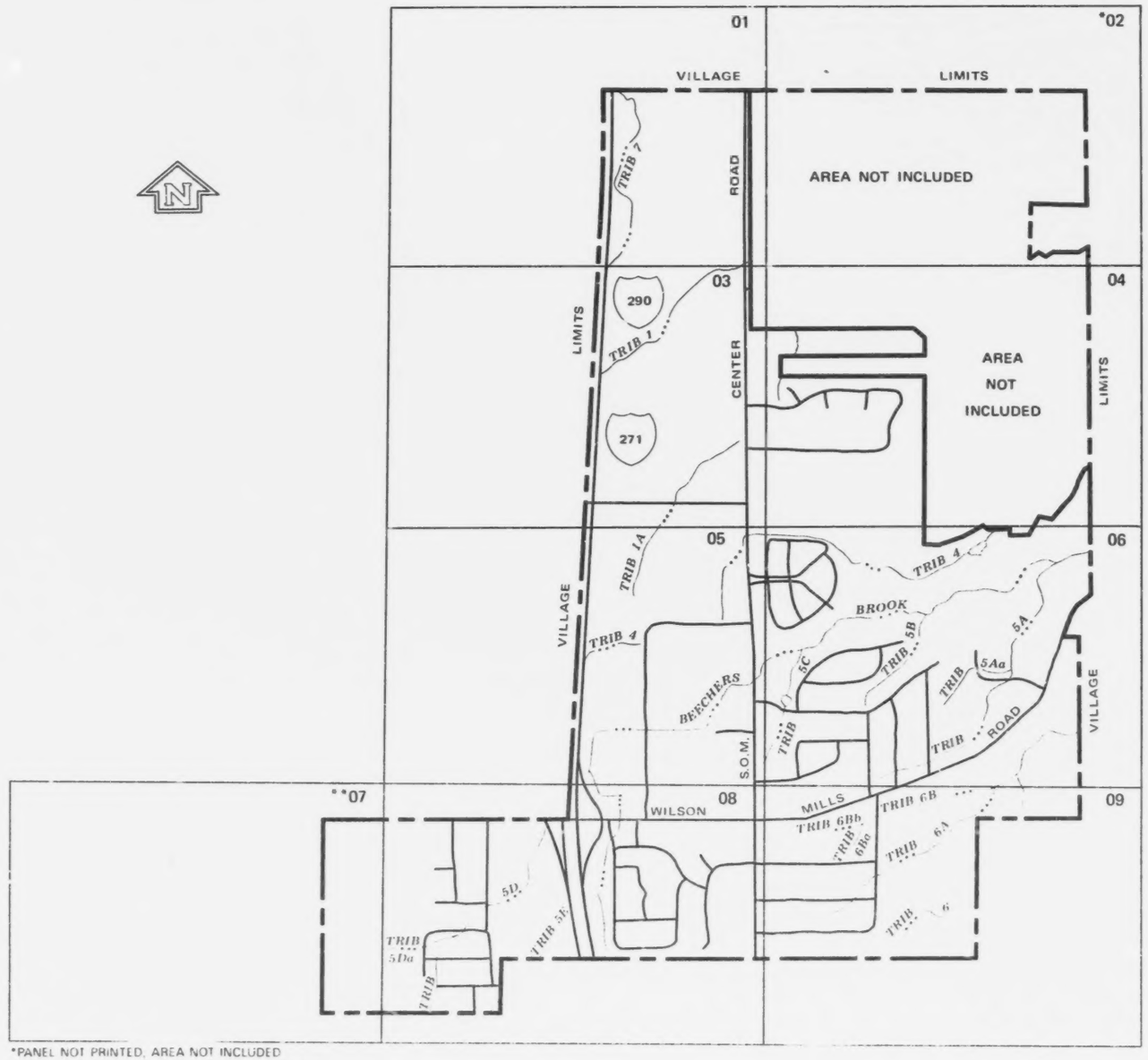
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

(CUYAHOGA CO.)

FLOOD PROFILES

TRIBUTARY 5D



*PANEL NOT PRINTED, AREA NOT INCLUDED
**PANEL NOT PRINTED, NO FLOODWAY DELINEATED

KEY TO MAP

500-Year Flood Boundary

100-Year Flood Boundary

FLOODWAY FRINGE

100-Year Flood Boundary

500-Year Flood Boundary

Approximate 100-Year Flood Boundary

Cross Section Line — A — A

Elevation Reference Mark — RM 7 ×

River Mile — ●M1.5

NOTES TO USER

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

This map was prepared to facilitate flood plain management activities only; it may not show all special flood hazard areas in the community or all planimetric features outside of the flood plain. Refer to the latest official Flood Insurance Rate Map for any additional areas of special flood hazard.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 1/20 inch.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent ot the issuance of this map.

FLOOD BOUNDARY AND FLOODWAY MAP EFFECTIVE: DECEMBER 24, 1976

FLOOD BOUNDARY AND FLOODWAY MAP REVISIONS:

Map revised March 16, 1988
to delete floodway and cross sections, change flood boundaries, and relocate stream channel.

FEDERAL EMERGENCY MANAGEMENT AGENCY

FBFM

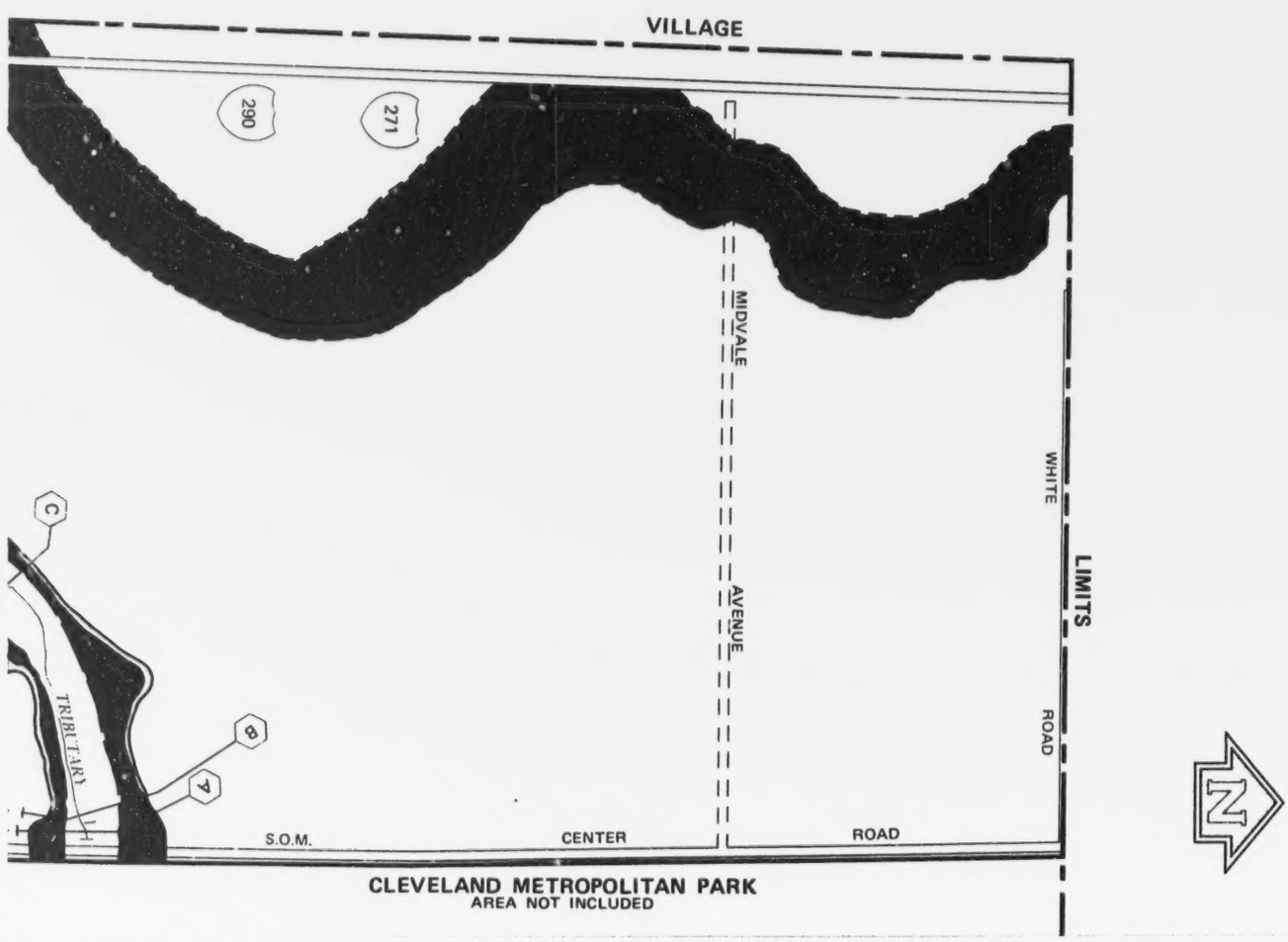
FLOOD BOUNDARY AND FLOODWAY MAP 01-09

MAP INDEX

VILLAGE OF MAYFIELD, OH

CUYAHOGA CO.

COMMUNITY NUMBER 390116



MAP 01

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

CUYAHOGA CO.

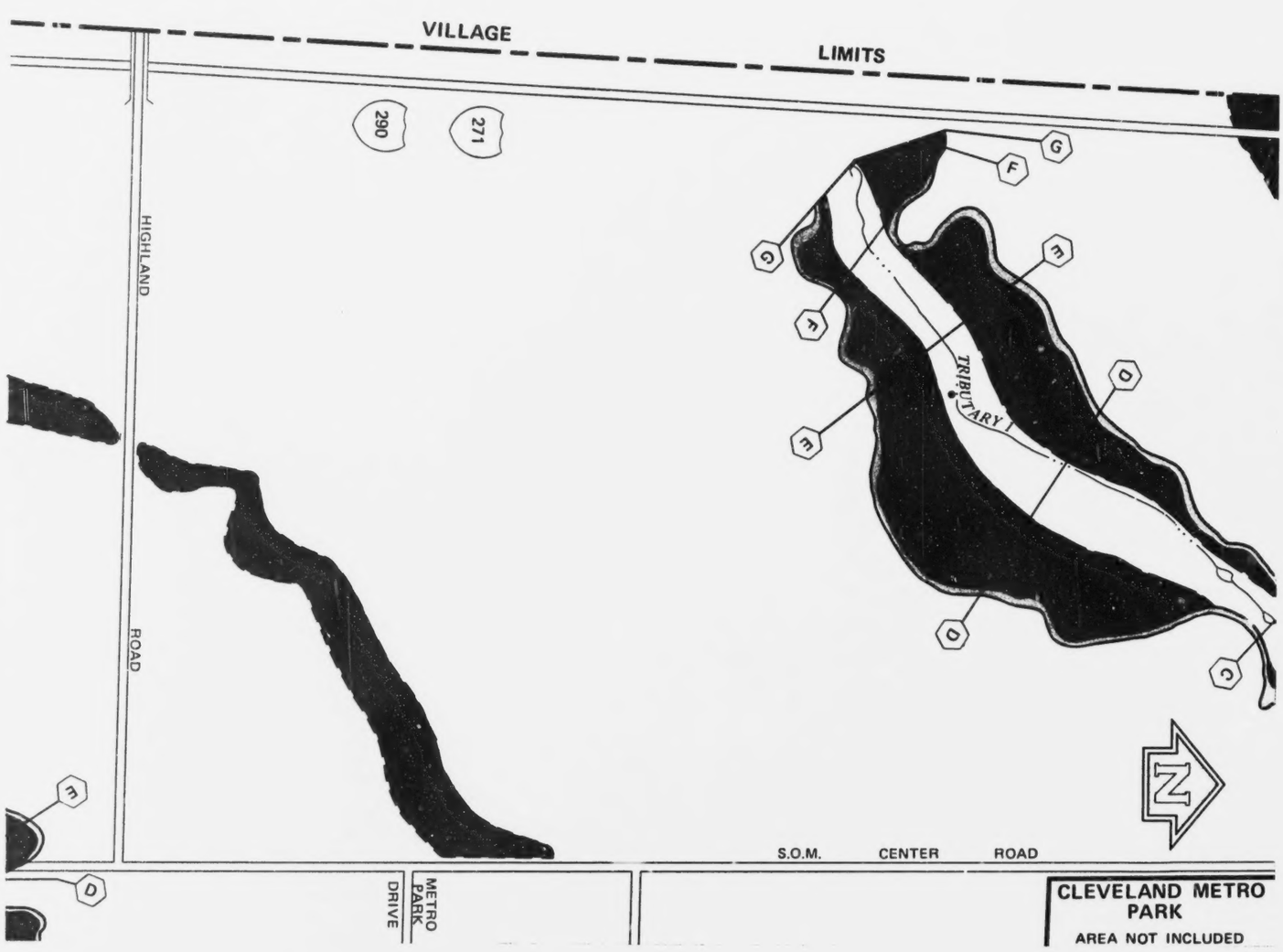
APPROXIMATE SCALE

400 0 400 800 1200 FEET

FLOOD BOUNDARY AND FLOODWAY MAP

COMMUNITY NUMBER 390116

MAP REVISED:
MARCH 16, 1988



MAP 03

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

CUYAHOGA CO.

APPROXIMATE SCALE

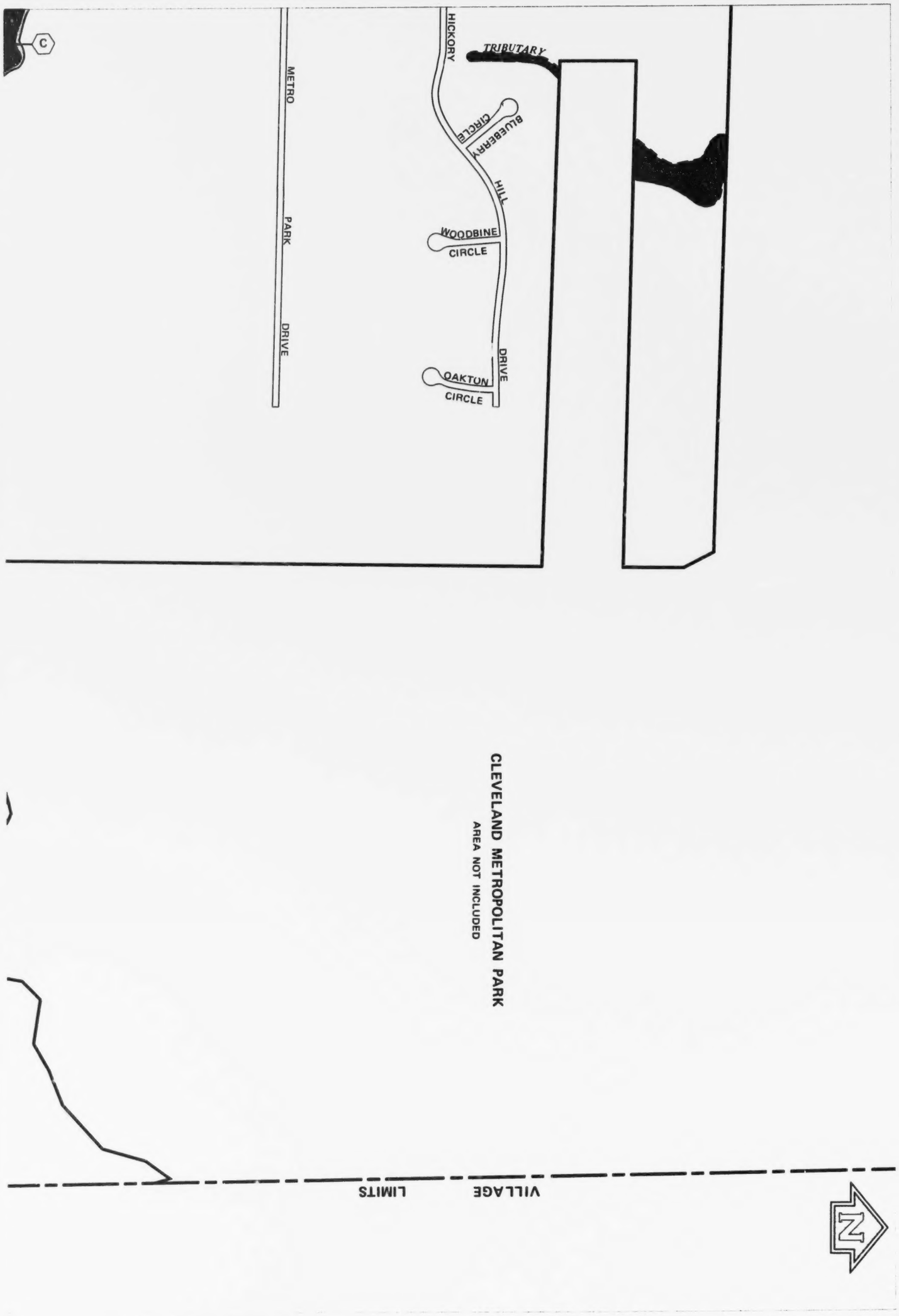
400 0 400 800 1200 FEET

FLOOD BOUNDARY AND FLOODWAY MAP

COMMUNITY NUMBER 390116

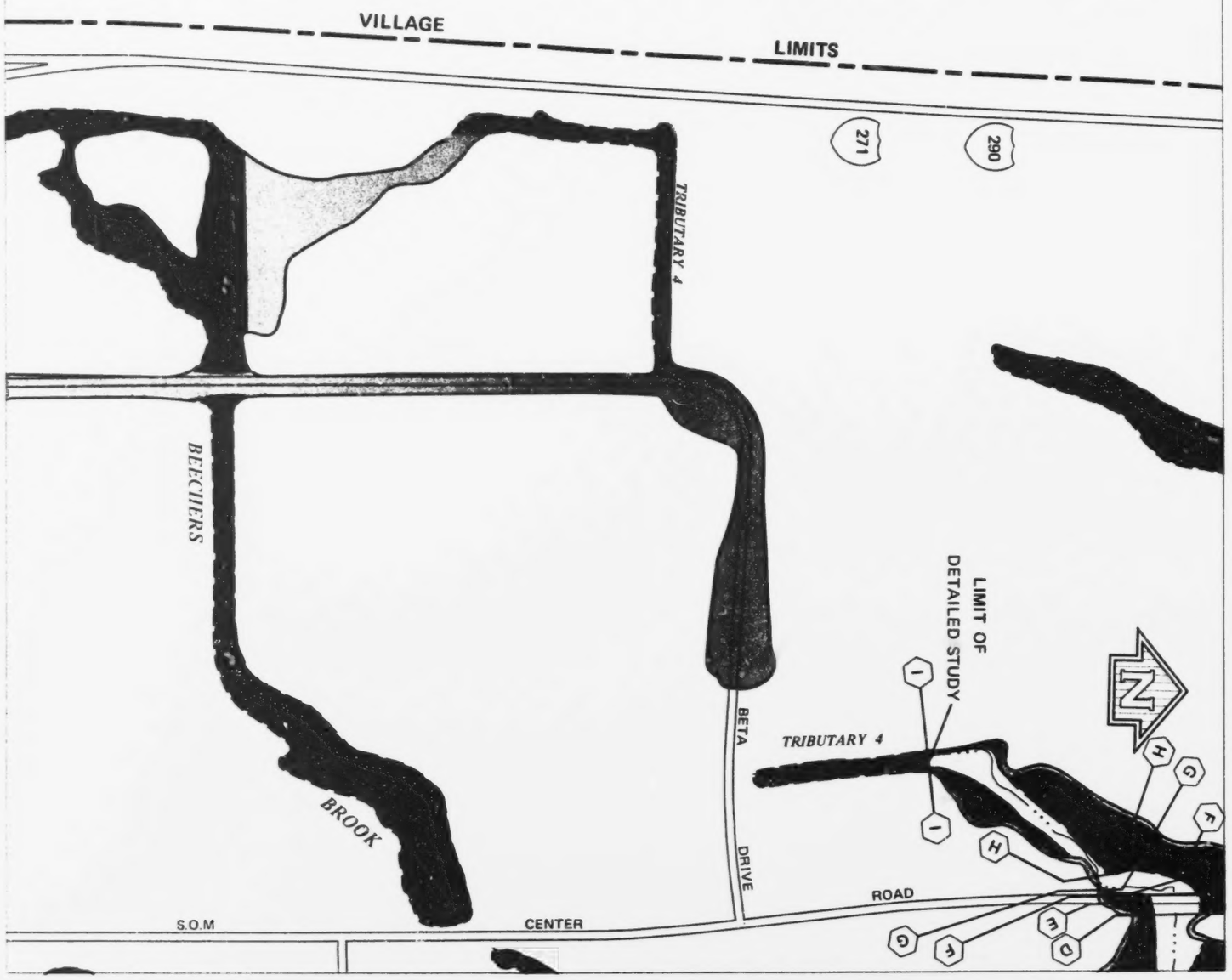
MAP REVISED:

MARCH 16, 1988



36

MAP 04	FEDERAL EMERGENCY MANAGEMENT AGENCY VILLAGE OF MAYFIELD, OH CUYAHOGA CO.	APPROXIMATE SCALE 400 0 400 800 1200 FEET FLOOD BOUNDARY AND FLOODWAY MAP COMMUNITY NUMBER 390116	MAP REVISED: MARCH 16, 1988



MAP 05

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

CUYAHOGA CO.

APPROXIMATE SCALE

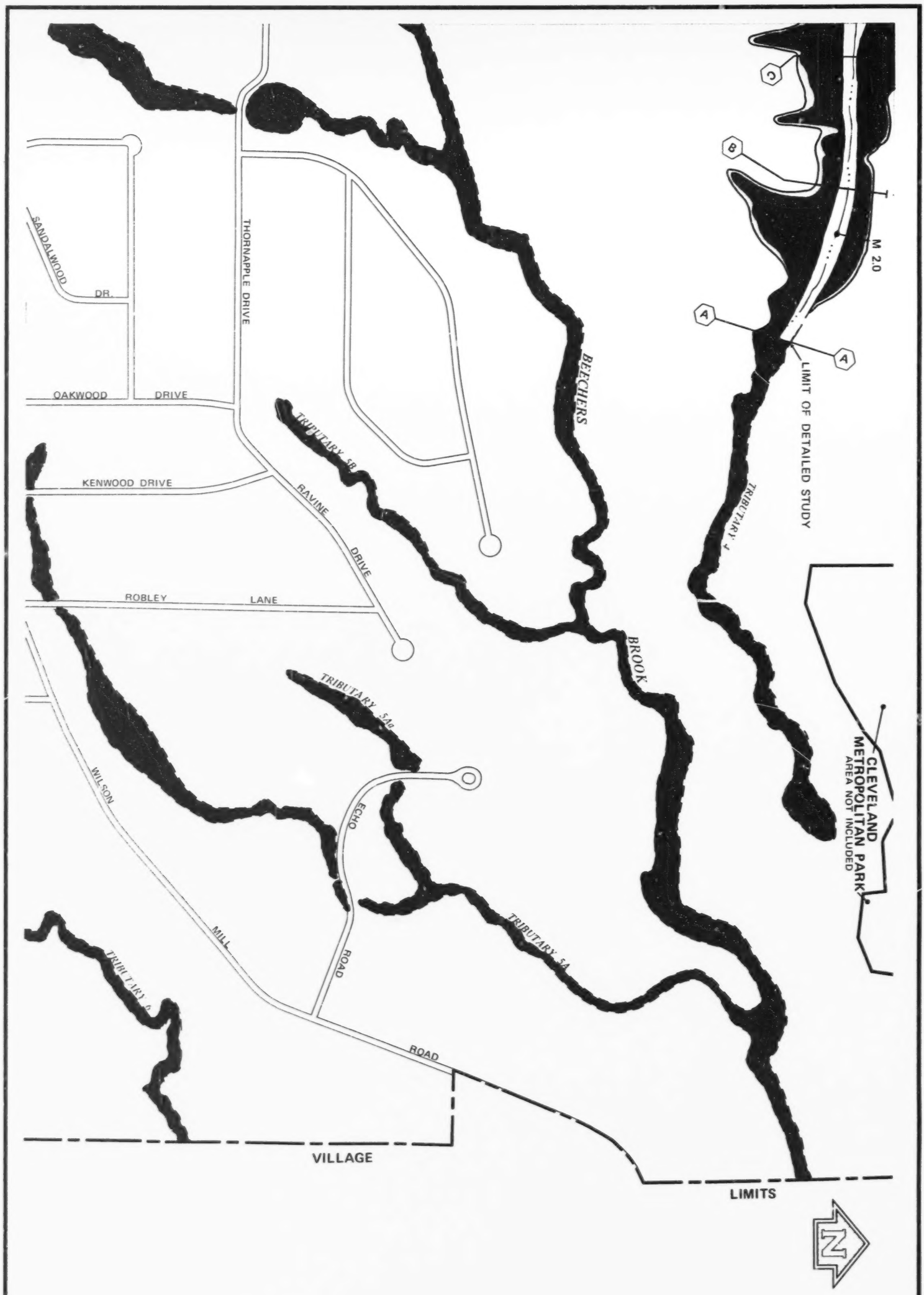
400 0 400 800 1200 FEET

FLOOD BOUNDARY AND FLOODWAY MAP

COMMUNITY NUMBER 390116

MAP REVISED:

MARCH 16, 1988



MAP 06

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

CUYAHOGA CO.

APPROXIMATE SCALE

400 0 400 800 1200 FEET

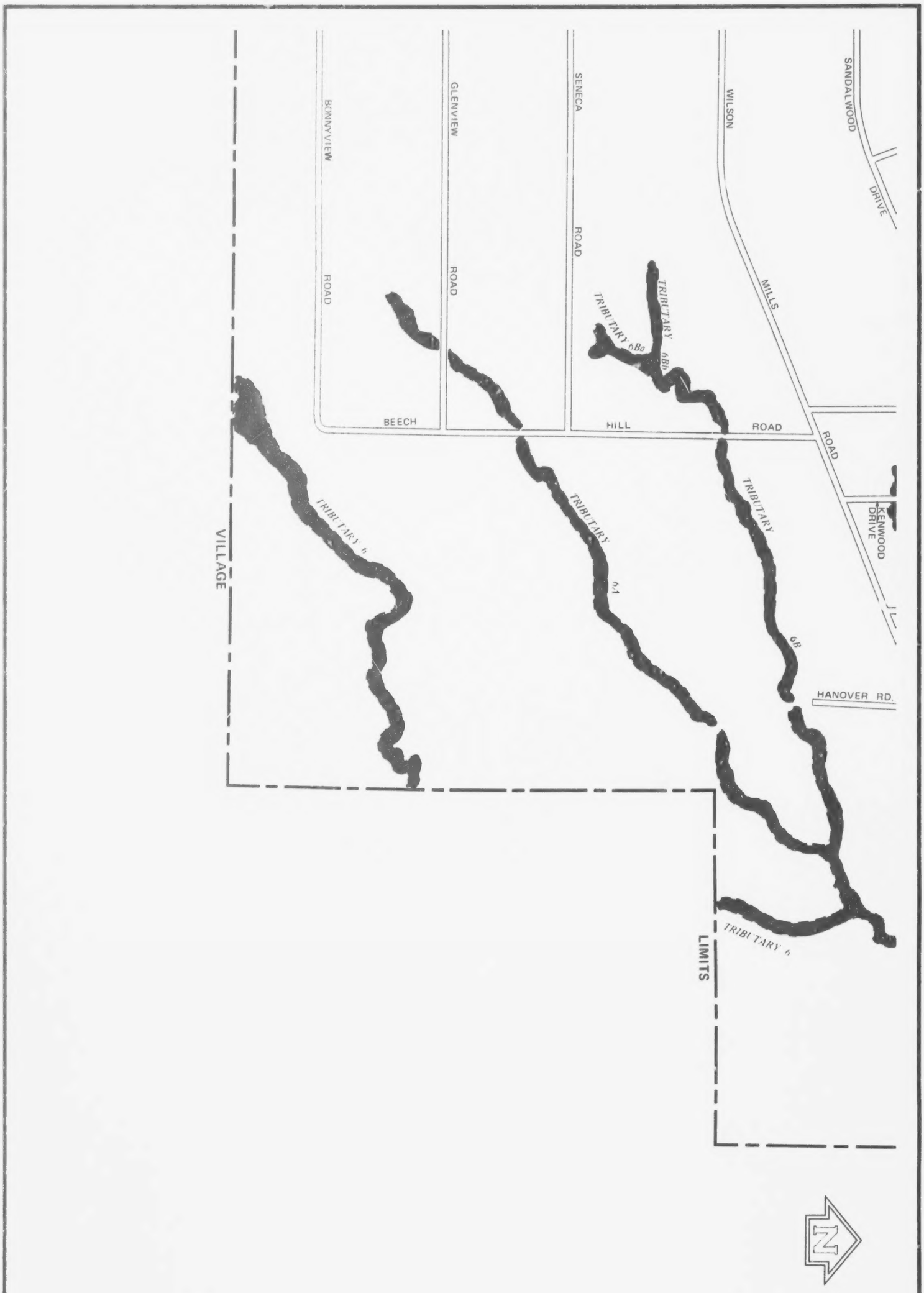
FLOOD BOUNDARY AND FLOODWAY MAP

COMMUNITY NUMBER 390116

MAP REVISED:

MARCH 16, 1988

MAP 08	FEDERAL EMERGENCY MANAGEMENT AGENCY VILLAGE OF MAYFIELD, OH CUYAHOGA CO.	APPROXIMATE SCALE 400 0 400 800 1200 FEET FLOOD BOUNDARY AND FLOODWAY MAP COMMUNITY NUMBER 390116	MAP REVISED: MARCH 16, 1988



MAP 09

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH

CUYAHOGA CO.

APPROXIMATE SCALE

400 0 400 800 1200 FEET

FLOOD BOUNDARY AND FLOODWAY MAP

COMMUNITY NUMBER 390116

MAP REVISED

MARCH 16, 1988

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (MSL)	DESCRIPTION OF LOCATION
RM 1	902.52	Cross on N.E. corner of E. headwall of concrete culvert. Approximately 30 feet E. of C.L. of S.O.M. Center Rd. and 2,800 feet S. of White Rd. 49.54 feet E. of N&V in CEI OBT pole no. 236171 on W. side of S.O.M. Center (T.B.M. 16).
RM 2	926.99	Approximately 40 feet W. of C.L. of S.O.M. Center Rd. and 40 feet N. of C.L. of Highland Rd. 57.29 feet N.W. of I.P. in mon. box at C.L. intersection. 19.97 feet N.E. of drill hole in center brick headwall of culvert N.W. corner (O.M. 471).

ELEVATION REFERENCE MARKS

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF MAYFIELD, OH
(CUYAHOGA CO.)

01